aërobic and anaërobic decompositions proved entirely too much for the author:—

"Curiously enough, he says, "some scientists say that if air is admitted to the soil nitrogen is set free from the organic matter; and, on the other hand, if air is excluded, nitrogen is set free from the nitrates; and in both cases it is lost. These views would appear to be mutually destructive."

The chemist is still worse: when appealed to by growers to help in checking plant-diseases,

"the chemist, like a sensible man of business, immediately proceeded to compound his nostrums and to talk learnedly about the fungoid and other diseases, at the same time not forgetting to take the fees to recompense him for his learning and skill."

But perhaps the most severe treatment is reserved for Rothamsted.

"The cultivation seems to be of the poorest description; in fact, it can hardly be described as cultivation at all. . . . One can imagine the condition of the soil . . . it must be almost as hard as rock, and impervious to rain, air, or roots. . . . Farming on the Rothamsted principle would appear to be a very precarious business."

As all this occurs in a science section, first-hand information was apparently deemed superfluous; nevertheless, a visit to Rothamsted first of all might not have been a bad idea. After this we are quite prepared for the author's scheme for making the wheat crop yield a profit of more than 70*l.* per acre, instead of 4*l.* or less as at present. The experimental basis consists of a trial made at Ealing in 1910 with 400 seeds; the results are multiplied up till they can be expressed in terms of one acre; and this in turn is multiplied up till the author foresees that "thousands of men would be kept on the land at better wages, and our wheat crops would be increased enormously. Agriculturists would do well to consider the above figures before smiling too broadly at them." Unfortunately, agriculturists have had these paper schemes presented to them fairly often for at least 250 years past, and now they require facts. Enough has been said, however, to show the sort of "science" that is considered good enough for growers.

E. J. RUSSELL.

TEXT-BOOKS OF PHYSICS.

(1) *Experimental Mechanics and Physics.* By A. H. E. Norris. Pp. viii+176. (London: Mills and Boon, Ltd., n.d.) Price 1*s.* 6*d.*

(2) *Elementary Physical Optics.* By W. E. Cross. Pp. 312. (Oxford: Clarendon Press, 1913.) Price 3*s.* 6*d.*

(3) *Heat: A Manual for Technical and Industrial Students.* By J. A. Randall. Pp. xiv+331. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1913.) Price 6*s.* 6*d.* net.

(4) *A Synopsis of the Elementary Theory of Heat and Heat Engines.* By J. Case. Pp. iii+65. (Cambridge: W. Heffer and Sons, Ltd., 1913.) Price 2*s.* 6*d.* net.

(5) *Elementary Principles of Electricity and Magnetism for Students in Engineering.* By Dr. R. H. Hough and Dr. W. M. Boehm. Pp. vii+233. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1913.) Price 6*s.*

(6) *Transport de Force.* Calculs Techniques et Economiques des Lignes de Transport et de Distribution d'Energie Electrique. By C. Le Roy. Deuxième Partie. Pp. 143. (Paris: A Hermann et Fils, 1913.) Price 6 francs.

(7) *First Year Course in General Science: A Combined Text-book and Note-book.* By E. A. Gardiner. Pp. vi+113. (London: W. Heinemann, n.d.) Price 2*s.* 6*d.* net.

(1) THE title of this little book is rather misleading. The use of the word "physics" suggests that the contents of the book comprise the various branches of physics, and not merely—as is actually the case—heat and a meagre treatment of a few of the properties of matter. These subjects occupy only one quarter of the volume, the remainder being devoted to mechanics. The treatment is very simple and is suitable as an introductory course. In this respect the book will no doubt serve its purpose as efficiently as many others of its class, although it exhibits no noteworthy advances in the mode of presentation of the subject. The frequent change of type is rather an unfortunate feature, and some of the diagrams are very badly drawn, notably a cube used to represent the measurement of volume, the perspective of which is in exactly the wrong sense.

(2) This book has several very good points. The subject is treated in a straightforward and lucid manner. The author has endeavoured to develop the theory of optics upon both "ray" and "wave" bases simultaneously, and we think he has succeeded. There is much to be said for both methods of treatment, and neither should be ignored. As is natural in an elementary treatise, no very difficult problems are considered, but it is rather surprising to find practically no reference to diffraction and interference, especially as some stress is laid on the wave theory. There are many simple experiments in this connection which, far from confusing a junior student, would undoubtedly interest him. One of the most notable

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features of the book is the series of diagrams, which are well drawn, and often a whole page is devoted to a single figure, with the result that a very clear representation is secured.

(3) One is inclined to think that too much is being done nowadays in the matter of adapting branches of study to the special needs of various classes of students. Text-books of physics, and presumably of other subjects also, are written from the point of view of subsequent work, and the result is often detrimental to the students themselves. It is scarcely possible to avoid a certain looseness of language and an inexactness of expression when the subject is submitted to the special mode of treatment in question. The present book is quite a good one in many ways, and no doubt contains a great deal of useful information with regard to heat and heat engines. It is good to find the subject introduced from the point of view of energy, although the discussion of the meaning of energy is evidently handicapped by the knowledge on the part of the author of the very limited training in mechanics possessed by the students for whom the book is written. To each chapter the author appends a summary in heavy type of the important conclusions therein, together with a number of problems based on the work. Apart from the limitations imposed by the mode of treatment referred to, this book is a straightforward and lucid presentation of the subject.

(4) This pamphlet is frankly published for "cramming" purposes. It is intended as a synopsis for students reading for the Mechanical Sciences Tripos, and especially for the "A" paper in Heat. In order to make this perfectly plain the author leads off with some forty lines of doggerel, which, if committed to memory, apparently ensures success in the examination. To those students who regard their study of physics from this point of view, the book will prove useful in proportion to what they remember of its contents; to the serious student it can scarcely be recommended. For so small a volume the table of "errata" is too long; indeed, it rather looks as though this handbook has been hurriedly prepared.

(5) There is room for doubt as to whether it is desirable in a book on electricity and magnetism to avoid almost entirely references to the physical, as distinct from the mathematical, side of the subject. This is the only fault we have to find with this treatise, which is otherwise quite excellent. And even this objection disappears if it can be guaranteed that the book will be read concurrently with attendance at experimental lectures and laboratory work. Most teachers find that students of physics experience much more difficulty with the mathematics it involves than with the experimental principles upon which it is based. To those students this book should prove a boon. Here they will find presented in logical order and in a simple manner an extensive series of deductions from, and applications of, the fundamental laws of electrostatics, magnetism, and electromagnetics. Numerous numerical examples are appended to the various chapters, and at the end of the book the more important formulæ developed in it are compiled in a list. The use of this list, of course, involves the adoption of a particular notation in the memory of the student, and this, perhaps, is a little inexpedient at a time like the present, when notation varies so much; but it is not easy to see how to overcome the difficulty.

(6) To those interested, both theoretically and practically, in the transmission of electrical power this volume should prove of great interest and use. The author has carried out a large number of calculations of the various electrical data required in this connection, with numerical examples. Graphical methods are frequently resorted to, and the treatment of the whole subject appears to be very complete.

(7) The chief objection to this type of book is that it is very liable to become very dirty in the hands of a slovenly boy, and very unsightly, owing to numerous corrections, when written up by a boy who, though clean, is not brilliant. The instructions for the experiments are given clearly and neatly, and it seems rather a pity to spoil their appearance. The course comprises three parts, arranged more or less in order of difficulty, and a considerable number of simple experiments in mechanics, heat, and the physical and chemical properties of water and air are dealt with. At the end of each lesson a number of questions, intended for homework, are set. Presumably the answers to these are to be recorded in a separate notebook. Why not the experimental results also?

OUR BOOKSHELF.

Vegetation of the Peak District. By Dr. C. E. Moss. Pp. x + 235 + plates. (Cambridge University Press, 1913.) Price 12*s*. net.

QUICKLY following on Elgee's "Eastern Moorlands of Yorkshire," we have Moss's book on the vegetation of the Peak district, especially in its relations to geology and the chemical nature of the soil. Faunistic relations, so ably discussed by Elgee, are not considered by Moss. As the author remarks, the Peak district has no definite geographical boundaries, but his maps of the plant formations include the area lying between Mossley and Penistone to the north, and, approximately,

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